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Future Conditions Baseline and Conceptual Plan Traffic Analysis

EXECUTIVE SUMMARY

As part of its urban growth boundary (UGB) expansion efforts, the City of Grants Pass is looking at potential development patterns in the southwest quadrant of the City that will promote a range of choices for housing, transportation and employment while making efficient use of land and public infrastructure. The Neighborhood Centers studied in this memorandum are intended to accomplish a land use pattern to meet the identified needs by providing a mix of residential, employment, commercial, and public and open space areas, potentially reducing the number and length of vehicle trips.

	Scenario 1	Scenario 2	Scenario 3
New Daily Trips to/from All Potential UGB Areas			
Residential	30,020	27,960	28,530
Retail	12,070	10,490	14,370
Non-Retail	20,570	23,000	21,300
Total	**62,660**	**61,450**	**64,200**
PM Peak Hour Trips to/from SW Quadrant Areas Only	3,740	3,880	3,937

Source: DKS Associates

Table 1: Comparison of new trips created by land use scenario

This memorandum analyzes three UGB expansion scenarios, two of which incorporate the Neighborhood Center concept, and one that does not:

- Scenario 1: No Neighborhood Centers. Scenario contains relatively less intense land use within the potential Neighborhood Center areas, and more intense land uses in surrounding and other potential UGB expansion areas
- Scenario 2: Two Neighborhood Centers. Scenario (Centers 1 & 3) contains two Neighborhood Centers in the southwest quadrant of the City, and requires less intense land uses in other urban reserves areas.
- Scenario 3: One Neighborhood Center. Scenario (Center 3) contains one Neighborhood Center in the southwest quadrant of the City, and requires less intense land uses in other urban reserves areas than Scenario 1, but more than Scenario 2.

Note: This analysis was completed after initial development of Centers 1 and 2, completed in February, 2012. This analysis is based on subsequent refinement of the neighborhood Centers that included Centers 1 and 3.

Analysis of all three scenarios considers land uses in potential UGB expansion areas throughout the urban area, including key areas in the northeast and southeast quadrants of the City. Overall, each scenario adds about 3,500 new dwelling units and 2.3 million square feet of non-residential space to the City as a whole. This memorandum assesses how impacts to the transportation system differ depending on where in the City these new land uses are distributed, and how dense the development pattern is. Table 1 shows that Scenario 2 produces more trips within the study area than Scenario 1, but fewer throughout the City as a whole. Scenario 3 produces the most trips, both within and without the study area, due to a higher overall amount of commercial zoning.

Out of the three land use scenarios, Scenario 3, with the single Neighborhood Center centered on Willow Road and Demaray Drive, significant commercial land uses just east of the center, and no modifications to the network beyond those provided in Scenario 1, performs the worst overall. With no mitigation, the intersection of Dowell Road/Highway 199 is over capacity, and would require the most improvements. Hubbard Lane northbound at Redwood Avenue also experiences delay that exceeds the City's mobility standard.

Scenario 2 avoids the delay issues on Hubbard Lane by increasing network connectivity and providing a new all-way stop-controlled intersection at the Wolf Lane extension and Redwood Avenue. Also, the Dowell Road/Highway 199 intersection functions better than under Scenario 3 because it features less intense land use south of Highway 199, inducing fewer westbound left turns. Scenario 1 provides slightly better operations at Dowell Road/Highway 199 because it induces the fewest trips into and out of the southwest quadrant of the city. However, it requires similar mitigations to Scenario 2 in order to meet ODOT mobility targets. Also, the northbound Hubbard Lane approach at Redwood Avenue requires the same mitigation as Scenario 3.

Study Area

This analysis focuses on UGB expansion areas on the west side of Grants Pass, south of the Rogue River. The two Neighborhood Centers (NCs) included in the future land use scenarios for this study include:

- NC 1: Centered on Redwood Avenue, just west of Hubbard Lane
- NC 3: Centered on Willow Lane, just south of Highway 199

The general locations for the Neighborhood Centers are shown in Figure 1, along with the major street network and study intersections. Note that study intersections are somewhat different among the three scenarios, since changes to the street network are proposed depending on the location of Neighborhood Centers.

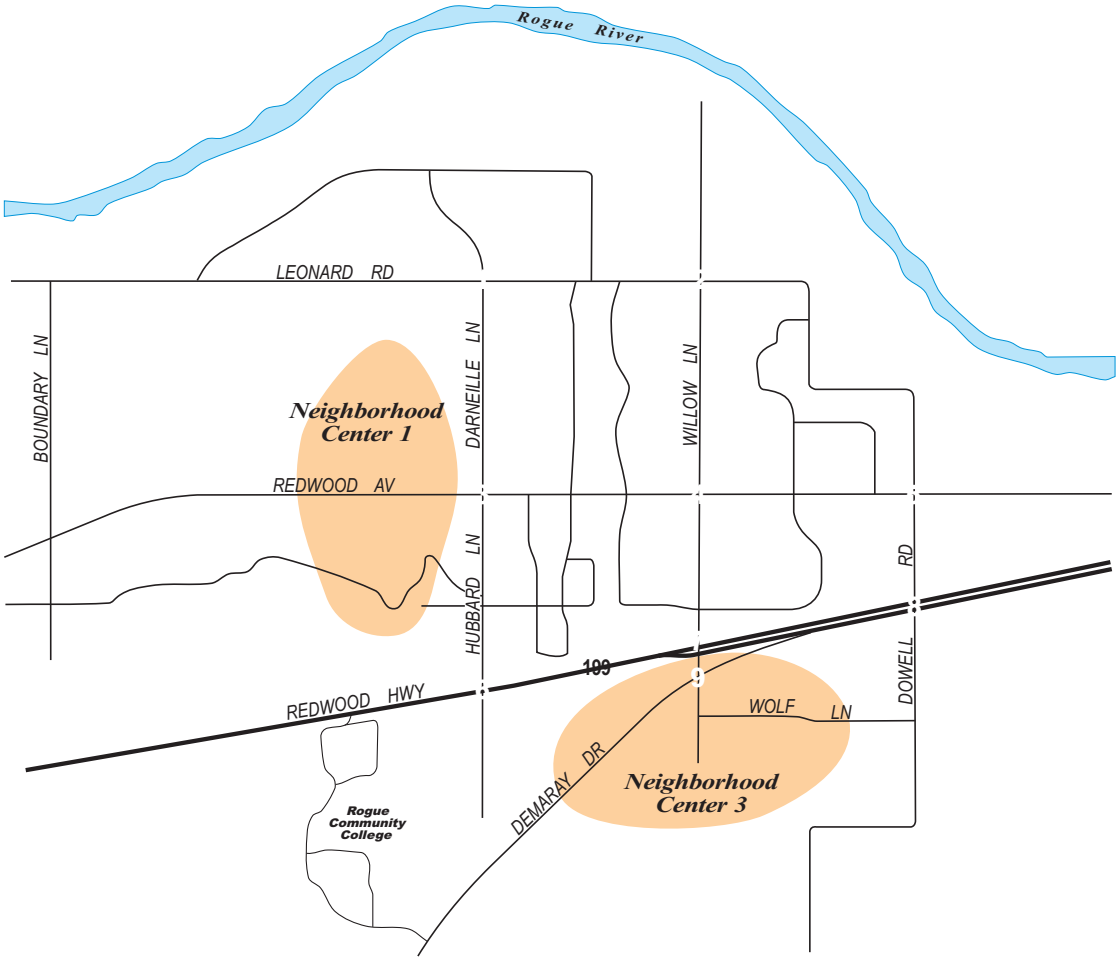


Figure 1: Study Area

EXISTING TRAFFIC VOLUMES

Prior to forecasting, base volumes were developed using traffic counts collected in May and June of 2011 . A review of traffic volumes within the study area over 15 minute increments showed that the p.m. peak hour occurs between 4:15 and 5:15 p.m. Counts at all intersections for this hour were adjusted to reflect weekday conditions during the highest traffic volume month of the year, for 30th highest hour analysis. The 30th highest hour traffic volumes are commonly used for design-hour considerations in transportation planning and analysis.

Seasonal Factoring

ODOT provides guidance on how seasonal factoring should be done, with methods varying depending on variables such as facility type, setting (urban/rural), and prevailing travel pattern. For the Neighborhood Centers study, the preferred methods are to use one or more Automatic Traffic Recorders (ATRs) within the study area (if they exist), or to use one or more ATRs that have characteristics similar to the facility being studied, in this case Highway 199.

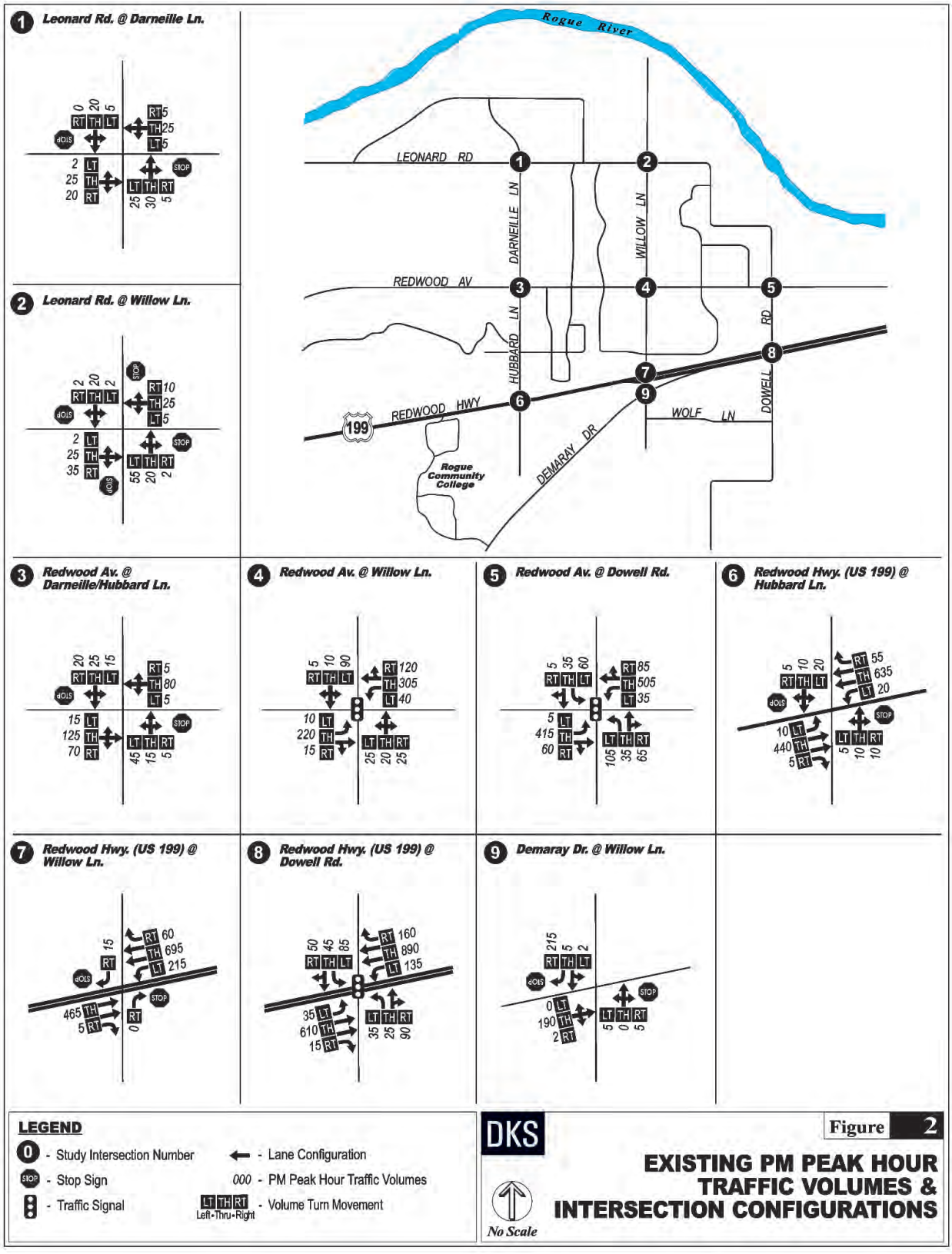
Because an ATR does not exist within (or reasonably close to) the study area, and other ATRs locations in the state are not sufficiently similar to the location being studies, the Commuter Trend factor from ODOT's 2011 Seasonal Trend table was used. The Commuter Trend results in a seasonal factor of 1.02 for locations counted in late May, and a seasonal factor of 1.01 for locations counted in mid-June.

Volume Balancing

For Highway 199, which has no access points between study intersections, volumes were balanced so that the number of vehicles entering from the upstream intersection matches the number of vehicles exiting from the downstream intersection. Volumes were not balanced at other study intersections, as there are numerous local connections on streets such as Redwood Avenue and Willow Lane that could result in a higher or lower volume when comparing the upstream and downstream intersections.

Final 2011 p.m. peak traffic volumes are shown in Figure 2.

Figure 2: Existing Volumes



FUTURE FORECASTING

This section describes the assumptions and process used to forecast 2025 p.m. peak hour volumes for the study intersections.

Travel Demand Model

The primary tool used for forecasting 2025 volumes was the Grants Pass travel demand model managed by the ODOT Transportation Planning and Analysis Unit (TPAU). The model area extends into rural areas surrounding the city and is divided into transportation analysis zones (TAZs). Each TAZ represents land uses that generate motor vehicle trips with specific origins and destinations on the network. The TAZ structure around the study area is shown in Figure 3.

The existing 2002 base and 2025 future scenarios for the Grants Pass model were used for this study, with modifications made to the 2025 scenario to reflect future conditions under the three land use scenarios. Resulting traffic growth on the network between 2002 and 2025 was then used to estimate future traffic conditions for each scenario as described in the Post-Processing section of this memorandum.

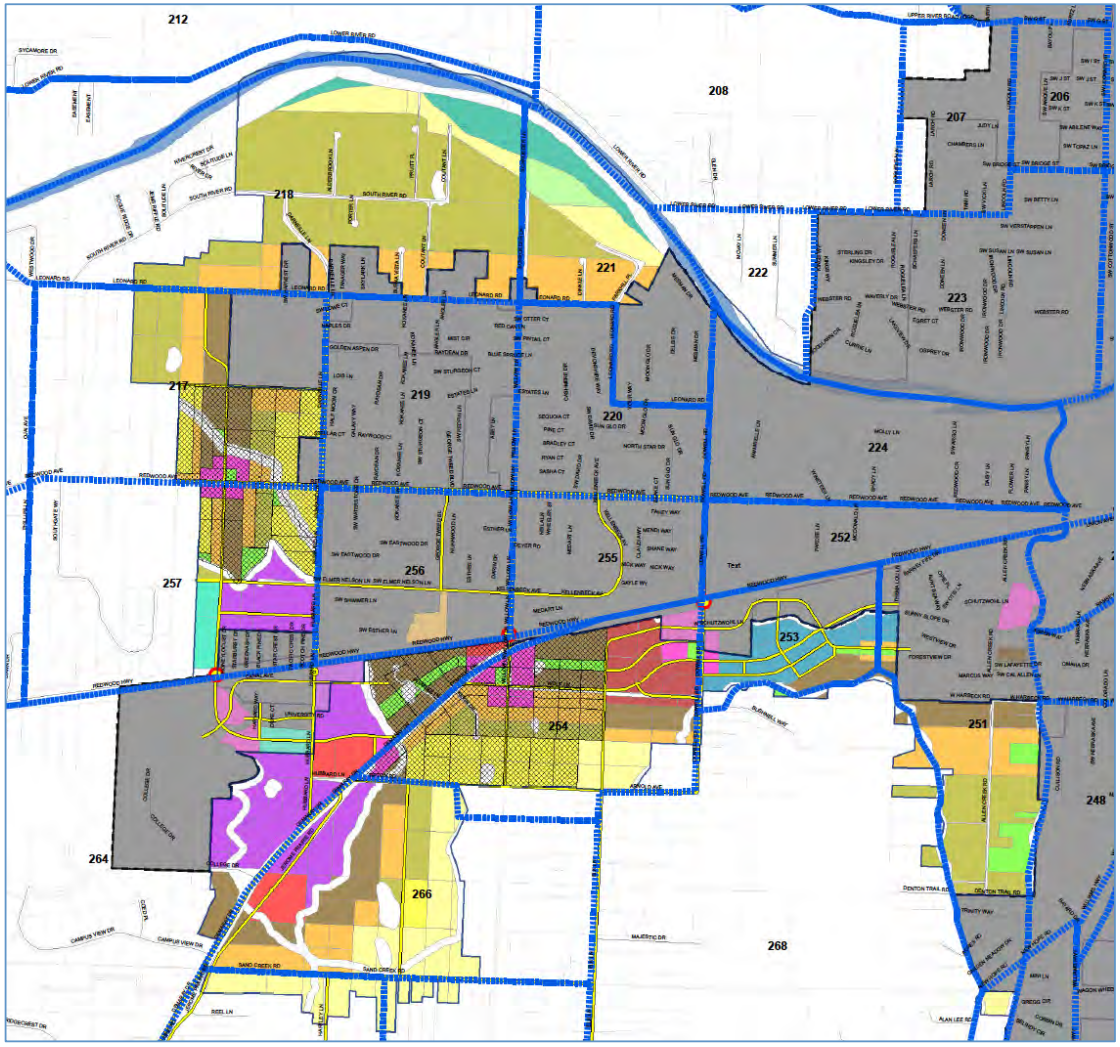


Figure 3: Grants Pass Travel Demand Model TAZ Structure -- Study Area

Land Use Scenarios

Traffic forecasting was developed based on the land uses assumed in three different UGB expansion scenarios. The scenarios are as follows:

- Scenario 1: No Neighborhood Centers. Scenario contains no Mixed Use zoning, but contains additional land uses in potential UGB expansion areas.
- Scenario 2: Two Neighborhood Centers. Scenario contains NC 1 and NC3, and a total of about 56 acres of Mixed Use zoning.
- Scenario 3: One Neighborhood Center. Scenario contains NC 3 and a total of about 18 acres of Mixed Use zoning.

Each scenario includes different assumptions about zoning surrounding NCs within non-Neighborhood Center potential UGB expansion areas, with the zoning in these areas complementing Neighborhood Center land use mixes so that the total of new land use is the same between the three scenarios. Figures 4-6 show the location of new zoning in and around the study area for the three scenarios, as well as proposed changes to the roadway network.

Figure 4: Scenario 1 UGB Expansion and Network

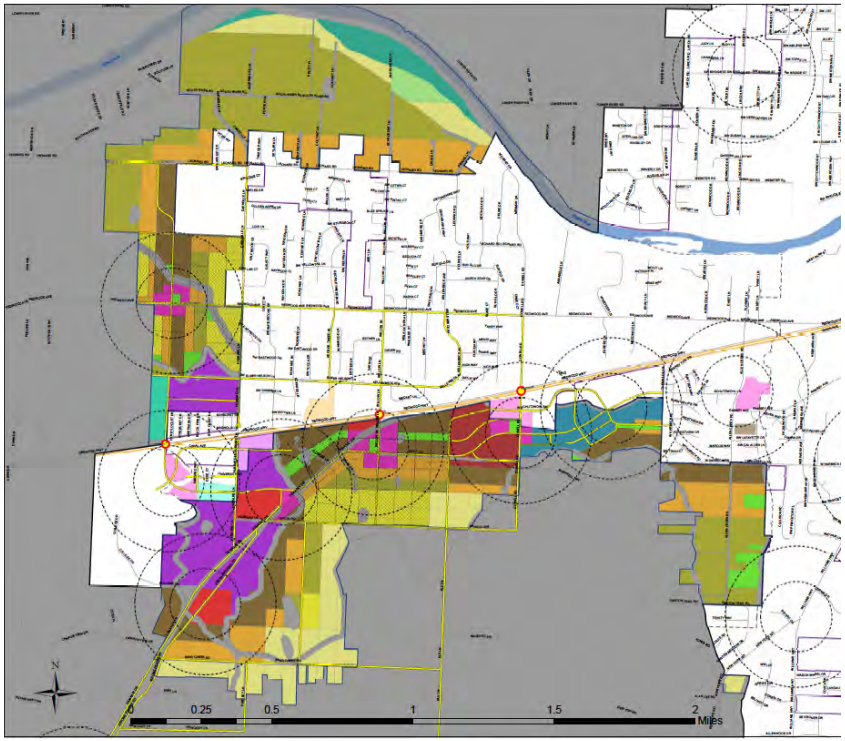


Figure 5: Scenario 2 UGB Expansion and Network

Figure 6: Scenario 3 UGB Expansion and Network

Land uses within the two Neighborhood Centers were considered separately from the rest of the UGB expansion areas. This project proposed a specific number of dwelling units and square footage of retail and office space in the two Neighborhood Centers, so specific calculations for those areas were done, while a more generalized approach was taken for non-Neighborhood Center areas. This approach is outlined below.

Buildable Acreage

For each scenario, a geographic information system (GIS) was used to calculate gross acreage taken up by each zoning type in the new, non-Neighborhood Center expansion areas outside the UGB, and to assign this acreage to TAZs in the Grants Pass travel demand model.

To calculate the net buildable acreage, 20% of the gross acreage was deducted from each land use. It is assumed that this 20% represents public right-of-way needs in the future urbanized areas. Lands in constrained areas, such as wetlands and floodways, were deducted for which no further trip generation calculations were done.

Floor-Area Ratio

The next step was to apply assumptions about the proportion of buildable land that would be developed within the planning horizon. A first step in developing these assumptions was to establish control totals for the number of new dwelling units and square footage of non-residential uses throughout the urban expansion areas. In coordination with City staff, the totals arrived at were 3,500 dwelling units and 2,300,000 square feet of non-residential (retail/employment) use. A portion of this would be within NC areas

Because the Neighborhood Centers feature somewhat higher density uses than the zoning assumed for non-Neighborhood Center UGB expansion areas, the floor-area ratio (FAR) and dwelling unit per acre (DU/acre) assumptions vary between the three scenarios, as shown in Table 2 below. This allowed a consistent overall total for certain land uses with higher density in the Neighborhood Centers, while areas outside the Neighborhood Centers were adjusted down.

As shown in the table, the Neighborhood Centers allow for somewhat less intense land use assumptions in the other UGB expansion areas, particularly in terms of housing.

Zoning	Scenario 1 (No NC)	Scenario 2 (2 NC)	Scenario 3 (1 NC)
Employment	0.16 FAR	0.15 FAR	0.14 FAR
NR (Office)	N/A	0.15 FAR	0.15 FAR
BP (Business Park)	N/A	0.15 FAR	N/A
Retail	0.20 FAR	0.20 FAR	0.20 FAR
MU-Retail/Res.[a]	N/A	0.20 FAR	N/A
MU-R-3/Office[b]	N/A	2.0 DU/acre	N/A
LR/R-1	2.9 DU/acre	1.0 DU/acre	1.5 DU/acre
MR/R-1	3.7 DU/acre	1.3 DU/acre	2.2 DU/acre
MR/R-2	4.4 DU/acre	1.8 DU/acre	3.0 DU/acre
R-3	5.4 DU/acre	1.9 DU/acre	3.6 DU/acre
R-5	8.7 DU/acre	2.9 DU/acre	5.6 DU/acre

[a] 20% of MU-Retail/Residential was changed to R-5, and the remainder was treated as retail use
[b] 20% of MU-R-3/Office was changed to NR, and the remainder was treated as residential

Table 2: FAR and DU/Acre assumptions for land use scenarios

Trip Generation

The FAR and DU/acre assumptions were applied to the buildable acreage in all portions of TAZs in the non-Neighborhood Center UGB expansion areas. This resulted in allocations of dwelling units and square footage for each zoning type for each TAZ, representing land uses that are in addition to what was already assumed for 2025 in the Grants Pass travel demand model. For each TAZ, new daily trips due to these land uses was calculated based on accepted trip generation rates. In consultation with city staff, the Institute of Transportation Engineers (ITE) codes selected for each zone are shown in Table 3.

ITE Land Use Code	Applicable Zones
210 (Single Family Detached Housing)	LR/R-1, MR/R-1, MR/R-2
221 (Low-Rise Apartment)	R-5
230 (Residential Condominium/Townhouse)	R-3, MU-R-3/Office
710 (General Office Building)	Emp, NR, BP
814 (Specialty Retail Center)	Retail, MU-Retail/Res.

Table 3: Land Use Code Assumptions for City Zoning Designations

Adjustments were made to the daily trip generation to account for internal trip capture and pass-by trips as well.

Internal Capture

The base trip generation calculations were estimated based on free-standing land uses. However, for the mixed-use zones (MU-R-3/Office and MU-Retail/Res.), an internal capture trip reduction was performed, based on the assumption that trips would be generated between the mixed-use area's land uses without using the study area roadway network. Internal capture trip generation was calculated for the development site using the methodology outlined in the ITE Trip Generation Handbook , resulting in a 15% reduction for mixed-use areas in Center 1 and a 14% reduction in Center 3.

Pass-By Trips

Some trips generated by retail uses will not be treated as stand-alone trips on the transportation network, but as pass-by trips. A pass-by trip calculation accounts for trips to retail destinations my motorists passing the site on the way from an origin to an ultimate destination. A review of pass-by rates in the ITE Trip Generation Handbook for retail sites comparable to sites in the UGB expansion area showed that 35% would be a conservative estimate of the number of pass-by trips for all retail uses in this study. Therefore daily trips generated by retail land uses were reduced by 35%.

Trip Comparison

After performing all trip generation steps, including internal capture and pass-by adjustments, trip generation for urban growth areas by TAZ was provided to ODOT for incorporation into new travel demand model runs. Total new trips under the three scenarios are shown in Table 4.

The table shows that Scenario 2 reduces the total number of new trips throughout the urban area, but slightly increases the number of trips in the southwest quadrant of the City. Scenario 3 results in more trips both in the southwest quadrant and in the urban reserve areas as a whole.

	Scenario 1	Scenario 2	Scenario 3
New Daily Trips to/from All Urban Reserve Areas			
Residential	30,020	27,960	28,530
Retail	12,070	10,490	14,370
Non-Retail	20,570	23,000	21,300
Total	**62,660**	**61,450**	**64,200**
PM Peak Hour Trips to/from SW Quadrant Areas Only	3,740	3,880	3,937

Source: DKS Associates

Table 4: Comparison of new trips from urban reserve areas

Network Changes

The daily trip generation totals resulting from the steps outlined above were provided to ODOT, which layered them on top of the trip generation already contained in the 2025 model. In addition, it was necessary to perform edits on the model network before running a new network assignment. All three land use scenario assume a signal at Willow Road and Highway 199 as well as a realignment of Demaray Drive to connect to an improved Wolf Lane rather than merge onto Highway 199.

The model network for Scenario 2 required more extensive edits to reflect the proposed closure of the Hubbard Lane at Highway 199 and realignment of Wolf Lane to cross Highway 199 near Rogue Community College to the west. Additional edits were made to all three networks to reconnect TAZs to appropriate locations on new roads such as Wolf Lane.

Post-Processing

After running the three 2025 scenarios, ODOT provided network-wide link volumes for all three scenarios for the p.m. peak hour, as well as select-zone and select-link plots showing the travel patterns of vehicles coming from or going to key TAZs and traveling on links of particular interest. Using these tools, motor vehicle turn movement forecasts were developed using post-processing methods consistent with ODOT's Analysis Procedures Manual. This approach is derived from methodologies outlined in the National Cooperative Highway Research Program (NCHRP) Report 255, Highway Traffic Data for Urbanized Area Project Planning and Design.

The post-processing methodology involves:

- Estimating model growth (i.e., volume differences between base and future models)
- Scaling the growth by the number of forecast years (i.e., forecast years – 2011 to 2025 -- divided by the difference in model years – 2002 to 2025)
- Adding the growth in volumes to base year (2011) seasonally factored traffic counts

Professional judgment is used as part of the post-processing methodology, with routing decisions identified by the select-zone and select-link plots serving as a helpful starting point in making volume adjustments. The results of this process are future design hour volume forecasts that become inputs for traffic operational analysis. These volumes are shown in Figures 7-9.

Figure 7: Scenario 1 Volumes

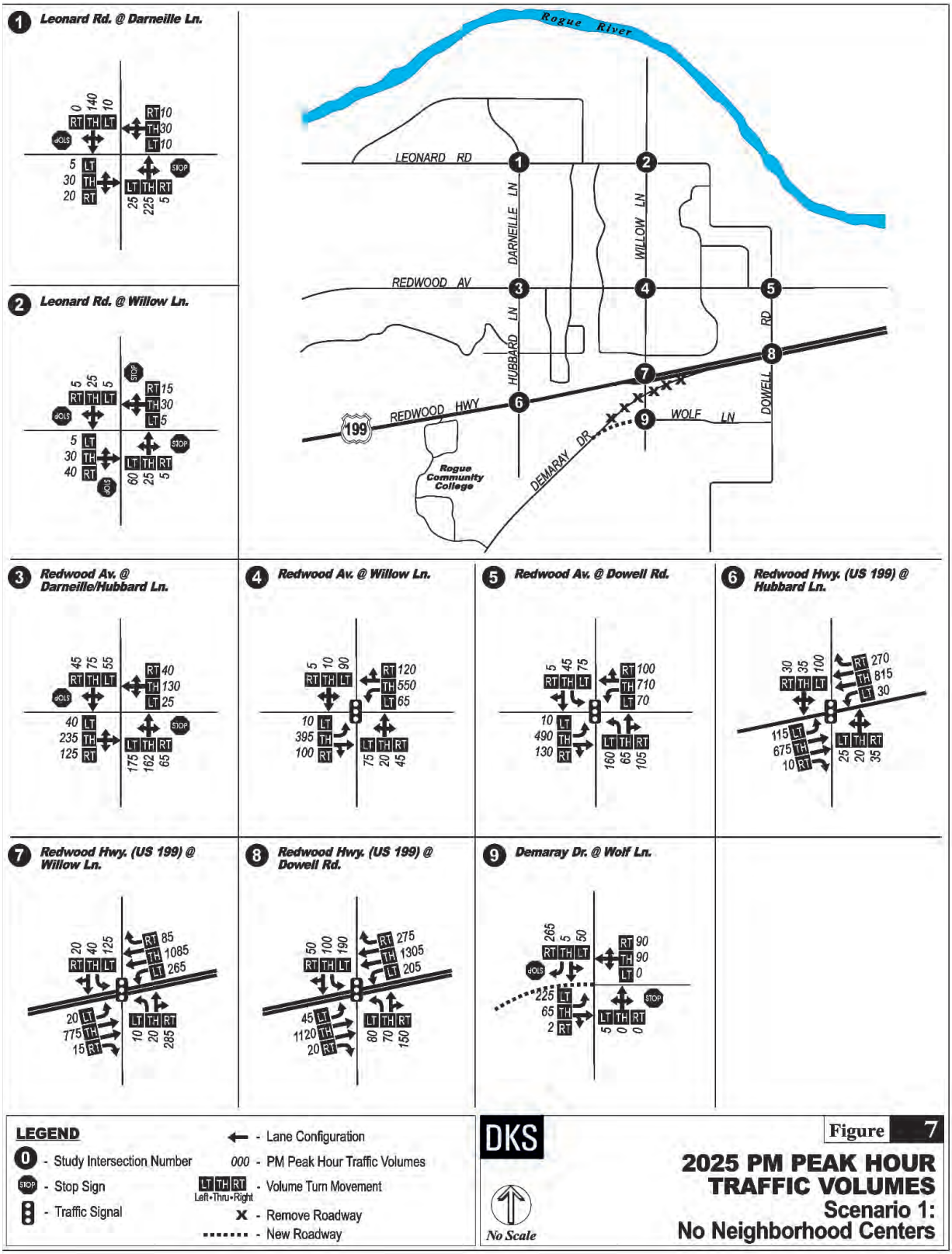


Figure 8: Scenario 2 Volumes

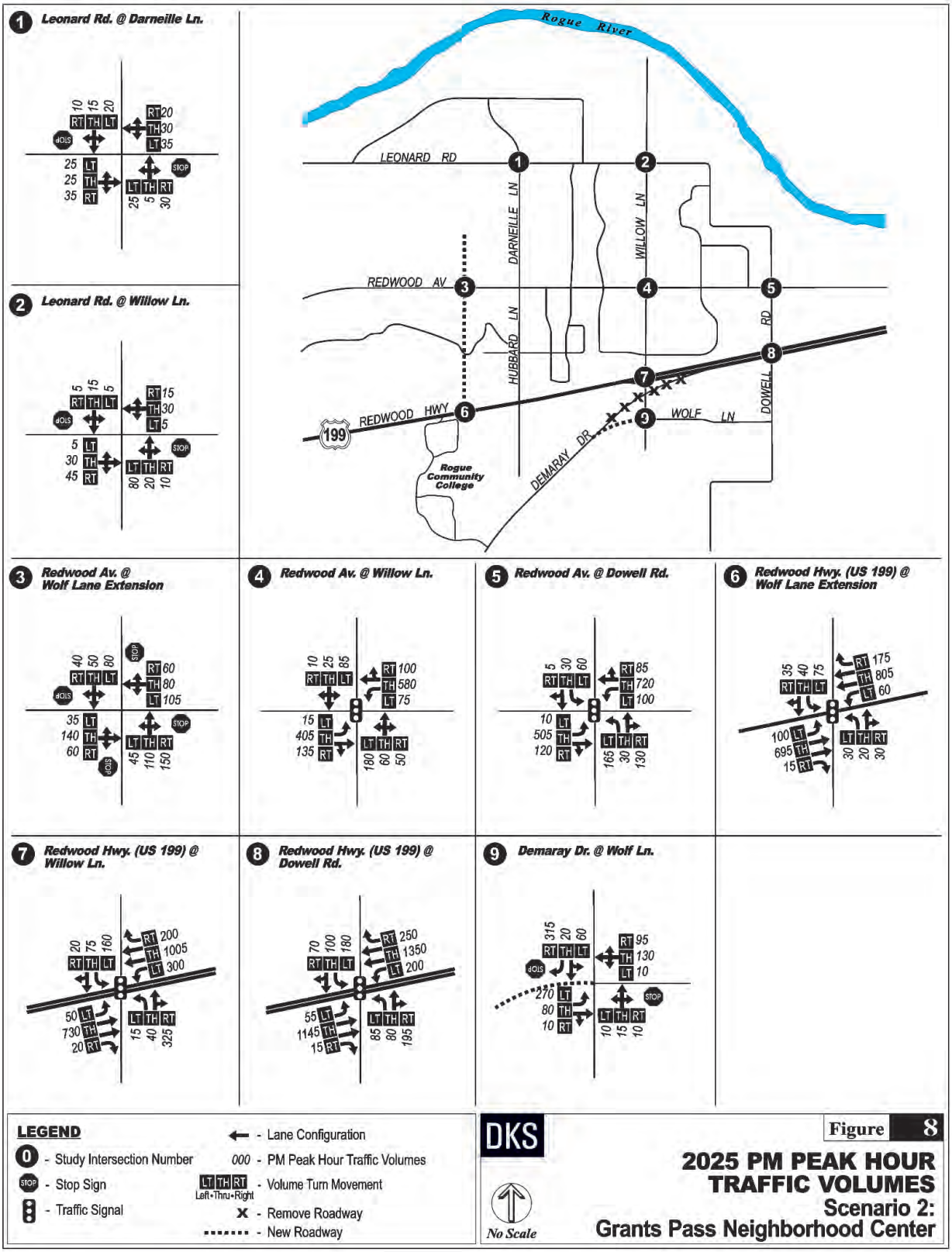
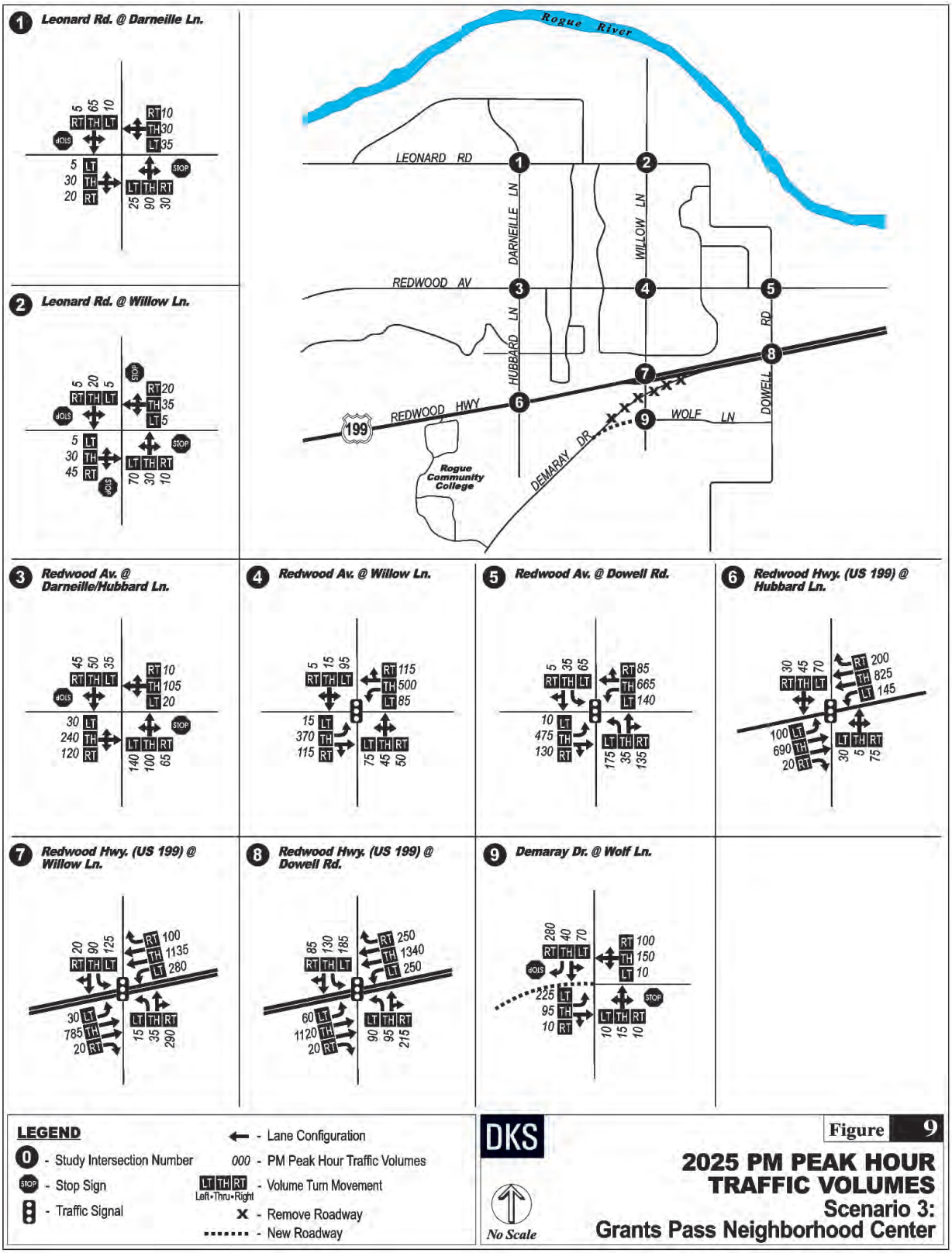


Figure 9: Scenario 3 Volumes



FUTURE TRAFFIC OPERATIONS

This section evaluates motor vehicle performance by analyzing intersection operations at study intersections on the proposed network for each scenario.

Intersection Operations Measures

The quality of operation at each study intersection is defined through three measures of effectiveness:

- Delay. Average delay, in seconds, experienced by drivers passing through an intersection.
- Level of Service. A report card rating (A through F) that grades intersections based on the amount of delay experienced.
- Volume-to-Capacity (v/c) Ratio. Compares the total volume entering an intersection to the overall capacity of the intersection, with a v/c under 1.0 representing an intersection that is operating under capacity, and a v/c over 1.0 representing an intersection that is experiencing significant congestion and queuing.

Mobility Targets

Each agency maintaining jurisdiction over an intersection in the study area has adopted mobility standards, or targets, that set the minimum level of performance required for their facilities. These mobility targets are used to gauge whether an intersection is operating acceptably, or whether mitigation may be needed in the future. The applicable mobility targets for the study area are as follows:

In the following sections, study area intersection operations are compared with mobility targets for all three scenarios under 2025 conditions in the p.m. peak hour, and mitigation options are discussed.

Roadway	Jurisdiction	Mobility Target
Highway 199 (Redwood Highway)	ODOT	0.80 v/c [a]
Non-ODOT signalized intersections	City of Grants Pass	LOS D [b]
Arterial and Collector approaches at unsignalized intersections	City of Grants Pass	LOS D

[a] Oregon Highway Plan, OHP Policy 1F revisions adopted December 21, 2011, http://www.oregon.gov/ODOT/TD/TP/docs/ohp11/policyadopted.pdf

[b] Grants Pass Urban Area Master Transportation Plan, Amended 5/21/08 by Ordinance 5447, http://www.grantspassoregon.gov/Index.aspx?page=1593

Table 5: Mobility targets for study area intersections

Scenario 1: No Neighborhood Centers

The no-Neighborhood Center scenario features somewhat less concentrated land use in the southwest quadrant of the City than the other two scenarios, dispersing a higher proportion of the employment and residential growth to other UGB expansion areas. As a result, Scenario 1 features less overall traffic entering and exiting the area. Table 6 shows how intersections perform under this baseline future scenario.

Two intersections do not meet mobility targets in 2025 under this scenario.

- The easternmost study intersection on Highway 199, at Dowell Road, has the highest volumes in the study area, and exceeds ODOT's mobility target of 0.80 for a Statewide Expressway. Analysis shows a separate northbound right turn lane will reduce the v/c to 0.84. The additional mitigation needed to meet the mobility target at this intersection is a second westbound left turn lane and a second receiving lane on the southern leg. Also, because the v/c is well below 1.0, obtaining a design exception from ODOT is an option.

Intersection	Control	Mobility Target	Delay	LOS[a]	V/C
Darneille Lane/Leonard Road	Unsignalized Four-Leg	LOS D	12.3	A/B	0.33
Willow Lane/Leonard Road	All-Way	LOS D	8.1	A	0.22
Hubbard Lane/Redwood Avenue	Unsignalized Four-Leg	LOS D	112.7	**A/F**	1.10
Willow Lane/Redwood Avenue	Signal	LOS D	17.3	B	0.71
Dowell Road/Redwood Avenue	Signal	LOS D	28.7	C	0.76
Dowell Road/Highway 199	Signal	0.80 v/c	30.2	C	**0.89**
Willow Lane/Highway 199	Signal	0.80 v/c	20.9	C	0.65
Hubbard Lane/Highway 199	Signal	0.80 v/c	13.8	B	0.50
Willow Lane/Wolf Lane	Unsignalized Four-Leg	LOS D	17.8	A/C	0.30

[a] For unsignalized intersections, LOS is shown for the major street movement/minor street movement
Bold indicates measures of effectiveness not meeting mobility targets

Table 6: 2025 Intersection Operations: Scenario 1 – No Neighborhood Centers (p.m. peak hour)

- The northbound Hubbard Lane approach to the Redwood Avenue/ Hubbard Lane intersection does not meet the City's LOS standard, and drivers moving northbound experience nearly two minutes of delay. This intersection does not meet signal warrants, and can be mitigated by converting it to a four-way stop, allowing all approaches to operate at LOS C or better.

Intersection	Control	Mobility Target	Delay	LOS[a]	V/C
Darneille Lane/Leonard Road	Unsignalized Four-Leg	LOS D	10.5	A/B	0.08
Willow Lane/Leonard Road	All-Way	LOS D	7.7	A	0.15
Hubbard Lane/Redwood Avenue	Unsignalized Four-Leg	LOS D	15.5	A/C	0.16
Willow Lane/Redwood Avenue	Signal	LOS D	23.5	C	0.81
Dowell Road/Redwood Avenue	Signal	LOS D	25.0	C	0.75
Dowell Road/Highway 199	Signal	0.80 v/c	38.9	D	**0.95**
Willow Lane/Highway 199	Signal	0.80 v/c	21.4	C	0.70
Willow Lane/Wolf Lane	Unsignalized Four-Leg	LOS D	26.5	A/D	0.38
Wolf Lane/Highway 199	Signal	0.80 v/c	11.1	B	0.46
Wolf Lane/Redwood Avenue	All-Way Stop	LOS D	13.3	B	0.52

[a] For unsignalized intersections, LOS is shown for the major street movement/minor street movement
Bold indicates measures of effectiveness not meeting mobility targets

Table 7: 2025 Intersection Operations: Scenario 2 – 2 Neighborhood Centers (p.m. peak hour)

Scenario 2: Two Neighborhood Centers

Scenario 2 assumes more land use intensity in the southwest quadrant of the City, and consequently more trips into and out of the quadrant. This scenario removes the Hubbard Lane connection to Highway 199, and introduces a new connection, extending Wolf Lane west towards Rogue Community College and then north across Highway 199 and through NC 1. Intersection performance for this scenario is shown below.

As in Scenario 1, the intersection of Dowell Road and Highway 199 does not meet the ODOT mobility target of 0.80 v/c. The addition of a northbound right turn lane on Dowell Road improves the v/c to 0.82. To meet the target of 0.80, a second westbound left turn lane and second receiving lane on the south leg are needed, similar to Scenario 1. As in Scenario 1, a design exception for this intersection is a potential option since the unmitigated v/c is under 1.0

With the disconnection of Hubbard Lane from Highway 199 and the realignment of Wolf Lane, the Redwood Avenue/Hubbard Lane intersection now meets standard. The new Wolf Lane/Redwood Avenue intersection is assumes to be a four-way stop, and meets the City mobility standard.

Scenario 3: One Neighborhood Center

Scenario 3 also assumes a higher land use intensity in the southwest quadrant of the City, although it features only one Neighborhood Center (NC 3), centered on the intersection of Willow Road and Wolf Lane. This scenario assumes the same future roadway network as Scenario 1. Intersection performance for this scenario is shown below.

Scenario 3 fails to meet mobility targets at the same locations as Scenario 1.

- The Dowell Road/Highway 199 intersection performs the worst under this scenario, exceeding capacity in 2025 with a v/c ratio of 1.01. This is primarily due to significant commercial land use south of Highway 199 at Dowell Road, which induces additional westbound left turns in the p.m. peak hour. The mitigation strategy for this intersection is more extensive than that for the other two scenarios. Adding a northbound right turn pocket improves the v/c to 0.89, and adding a second westbound left turn pocket (and second receiving lane on the south leg) improves the v/c to 0.81. In order to meet the mobility target, a second southbound left turn lane is needed on Dowell Road. Because the v/c is in excess of 1.0, a design exception for the intersection is a less likely option than for the other two scenarios
- The northbound Hubbard Lane approach operates better in Scenario 3 than in Scenario 1, but still fails to meet the City standard of LOS D. The intersection does not meet signal warrants, and the recommended mitigation is to convert the control to all-way stop. This allows the all approaches to operate at LOS C or better.

Intersection	Control	Mobility Target	Delay	LOS[a]	V/C
Darneille Lane/Leonard Road	Unsignalized Four-Leg	LOS D	11.2	A/B	0.21
Willow Lane/Leonard Road	All-Way	LOS D	7.7	A	0.15
Hubbard Lane/Redwood Avenue	Unsignalized Four-Leg	LOS D	37.4	**A/E**	0.77
Willow Lane/Redwood Avenue	Signal	LOS D	14.1	B	0.65
Dowell Road/Redwood Avenue	Signal	LOS D	24.1	C	0.72
Dowell Road/Highway 199	Signal	0.80 v/c	52.9	D	**1.01**
Willow Lane/Highway 199	Signal	0.80 v/c	20.7	C	0.62
Hubbard Lane/Highway 199	Signal	0.80 v/c	15.1	B	0.51
Willow Lane/Wolf Lane	Unsignalized Four-Leg	LOS D	24.0	A/C	0.45

[a] For unsignalized intersections, LOS is shown for the major street movement/minor street movement
Bold indicates measures of effectiveness not meeting mobility targets

Table 8: 2025 Intersection Operations: Scenario 3 – 1 Neighborhood Center (p.m. peak hour)

Summary of Operations

Out of the three land use scenarios, Scenario 3, with the single Neighborhood Center, significant commercial land uses just east of the center, and no modifications to the network beyond those provided in Scenario 1, performs the worst overall. With no mitigation, the intersection of Dowell Road/Highway 199 is over capacity, and would require the most improvements to meet the v/c mobility target of 0.80. Hubbard Lane northbound at Redwood Avenue also experiences delay that exceeds the City's LOS standard.

Scenario 2 avoids the delay issues on Hubbard Lane by increasing network connectivity and re-routing some north-south traffic to a new all-way stop-controlled intersection at the Wolf Lane extension and Redwood Avenue. Also, the Dowell Road/Highway 199 intersection functions better (0.95 v/c) than under Scenario 3 because it features less intense land use south of Highway 199, inducing fewer westbound left turns.

Scenario 1 provides slightly better operations at Dowell Road/Highway 199 (0.89 v/c), since it induces the fewest trips into and out of the southwest quadrant of the city. However, it requires similar mitigations as Scenario 2 in order to meet ODOT mobility targets. Also, the northbound Hubbard Lane approach at Redwood Avenue requires the same mitigation as Scenario 3.

Note: The final land use plan surrounding NCs can be coordinated with and 'fine tuned' to address specific traffic issues identified in the analysis.